Total No. of Questions : 12]

SEAT No. :

P3503

[Total No. of Pages : 5

[4959]-1
B.E. (Civil)
ENVIRONMENTAL ENGINEERING - II
(2008 Course) (Semester - I) (401001)

Time : 3 Hours] *[Max. Marks : 100*

Instructions to the candidates:

1) ***Attempt Q1 or Q2, Q3 or Q4 , Q5 or Q6, from Section I and Q7 or Q8, Q9 or Q10, Q11 or Q12 from Section - II.***
2) ***Figures to the right indicates full marks.***
3) ***Draw neat figures wherever necessary.***
4) ***Assume suitable data, if necessary.***
5) ***Use of scientific calculators is allowed.***

SECTION - I

Q1) a) Explain the significance of maximum and minimum velocities to be generated in sewer. Give any suitable equation for calculating self-cleansing velocity in sewer. **[8]**

b) Give the physical, chemical and biological characteristics of domestic sewage from urban area. **[8]**

OR

Q2) a) Specify the qualities of a good material for constructing sewers. Judging from these requirements, discuss the suitability of : **[8]**

i) Bricks

ii) Cement concrete

iii) Stone ware for sewers.

b) Calculate the velocity of flow and corresponding discharge in a sewer of circular section having diameter equal to 1m, laid at a gradient of 1 in 500. The sewer runs at 0.6 depth. Use Manning's formula taking n = 0.012. **[8]**

P.T.O.

Q3) a) Discuss the following zones of a stream which is undergoing self-purification. **[8]**

i) Zone of degradation

ii) Zone of active decomposition

iii) Zone of recovery

iv) Zone of clear water

b) Draw plan and c/s of a circular PST. Label all parts. **[8]**

OR

Q4) a) Explain the basic difference in working of grit chamber and PST. **[8]**

b) Design a grit chamber for the following data: **[8]**

i) Flow = 1500 m^3 per day.

ii) Settling velocity of particle 0.016 to 0.022 m/s.

iii) Flow through velocity 0.3 m/s.

Q5) a) What is meant by activated sludge process? What are the advantages and disadvantages? **[9]**

b) What do you understand by trickling filter? Explain in detail with a neat sketch and biological processes involved in it. **[9]**

OR

Q6) a) Explain terms with respect to activated sludge process **[8]**

i) HRT

ii) SRT

iii) MCRT

iv) F/M ratio

b) Design high rate single stage TF for population of 5000 persons. **[10]**

i) Domestic sewage at 150 lped having 200 mg/lBOD.

ii) Industrial waste ware at 0.25 MLD per day having 600 mg/l BOD.

Assume

1) BOD in primary clarifier = 35%.

2) Permissible organic loading of filter = 8000 kg/hect-m/day.

3) Recirculation ratio = 1.

4) Permissible surface loading = 160 ML/hec/day.

SECTION - II

Q7) a) Explain with a neat sketch, the working principle of a facultative stabilisation pond. **[8]**

b) Design a facultative stabilisation pond for the following data: **[8]**

i) Population to be served = 15000

ii) Sewage flow = 150lpcd.

iii) Location = 22^{o} N.

iv) Elevation = 900 M above MSL.

v) Mean Temp in January 26^{o} C max, 10^{o} C min.

vi) Influent BOD_5 = 225 mg/l.

vii) BOD reduction desired = 90%

viii) BOD removal rate constant at 20^{o} C = 0.1 per day.

If the effluent from the pond is to be used for irrigation, indicate whether any modification would be necessary.

OR

Q8) a) Explain advantages and disadvantages of a mechanically aerated lagoon. **[8]**

b) Explain with neat sketch, the constructional features of root zone cleaning system. **[8]**

Q9) a) Explain with neat sketch : working of 2-stage digester. Explain empirical formulae used to find the volume of the 2-stage digester. **[8]**

b) Explain with a neat sketch UASBR. **[8]**

OR

Q10)a) Explain with a neat sketch the pathway of anaerobic digestion. **[4]**

b) Explain with a neat sketch the working of a soak pit for the disposal of effluents from a septic tank. **[6]**

c) Design a septic tank for a hostel with following data: **[6]**

i) No. of users = 175

ii) Peak discharge = 210 1pm

iii) Desludging period = 1 year

Percolation rate = 20 min/cm for designing the dispersion trench.

Q11)a) Explain with neat sketch equalization and proportioning as applicable to Industrial Waste water Treatment. **[6]**

b) Explain with a neat sketch importance of neutralization as applicable to Industrial Wastewater Treatment. **[6]**

c) Draw a typical flow sheet for treating Dairy Waste. **[6]**

OR

Q12)a) Draw the flow diagram for treatment of industrial effluents from following industries **[8]**

i) Paper and pulp mill.

ii) Sugar industry.

b) Give in tabular form the characteristics of combined effluent from a sugar industry. **[5]**

c) Draw a typical flow sheet for treating automobile industry. **[5]**